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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/699,411	10/30/2003	Vladimir Grushin	PE0649USCNT1	2080
23906	7590	01/17/2006	EXAMINER	
E I DU PONT DE NEMOURS AND COMPANY LEGAL PATENT RECORDS CENTER BARLEY MILL PLAZA 25/1128 4417 LANCASTER PIKE WILMINGTON, DE 19805			SMOOT, STEPHEN W	
			ART UNIT	PAPER NUMBER
			2813	

DATE MAILED: 01/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

H.A

Office Action Summary

Application No.

10/699,411

Applicant(s)

GRUSHIN ET AL

Examiner

Stephen W. Smoot

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 September 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 24-26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 24-26 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 9-29-05.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

This Office action is in response to applicant's amendment filed on 29 September 2005.

Specification

1. The disclosure is objected to because of the following informalities: The specification, as currently amended, has two "Related Application" paragraphs because the as filed paragraph appearing on page 1, lines 8-12 was not replaced with the amended paragraph (see amendment filed on 29 September 2005, page 2). Further the applicant's transmittal letter, as filed on 30 October 2003, indicates that the present application is a continuation of 10/027,421 (not 10/366,295 as indicated in the applicant's amendment). Also, 10/027,421 is a continuation-in-part of 09/879,014 because it contains subject matter that is not part of 09/879,014 (e.g. formula XI, formula XII, Table 8, and Table 9). Additionally, the "Related Application" paragraph should be updated to indicate that 10/027,421 has issued as US 6,670,645 and that 09/879,014 is abandoned.

Appropriate correction is required.

Double Patenting

2. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

3. Claims 24-26 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 11 of U.S. Patent No. 6,670,645 B2 in view of Kwong et al. (US 6,835,469 B2).

Claim 11 of '645 specifies that an electronic device includes an organic layer that is comprised of a compound from the applicant's group of compounds as specifically claimed in claims 24-25 of the applicant's invention and as generally claimed in claim 26 of the applicant's invention.

However, claim 11 of '645 does not specifically claim that the organic layer is a light emitting layer, which is a limitation of claim 24, nor does it specifically claim that the organic layer is a charge transport layer, which is a limitation of claim 25. Also, claim 11 of '645 lacks the limitations of 26 of an emitting layer that contains at least 20 weight % of the generally claimed iridium complex and that has an emission maximum in the range of 570 to 700 nm.

Kwong et al. (US 6,835,469 B2) teach iridium complexes that include phenylquinoline ligands (see Fig. 2 – compound 9, column 12, lines 40-64, and column 32, line 53 to column 33, line 25). Regarding claim 24, Kwong et al. (US 6,835,469 B2) teach that these iridium complexes can be used in emissive layers corresponding to electronic devices. Regarding claim 25, it is reasonable to interpret that a light emitting layer is also a charge transport layer because the charges must move through the light-emitting layer in order to recombine. Regarding claim 26, the emissive layers taught by Kwong et al. (US 6,835,469 B2) can essentially consist of the iridium compound (i.e. 100 %) or the iridium compound can be added to a host material up to an amount of about 20 weight % (see column 12, lines 40-52). Further regarding claim 26, the emissive layers taught by Kwong et al. (US 6,835,469 B2) have an electroluminescence maximum that ranges from 550 to about 700 nm (see column 12, lines 53-55).

Therefore it would have been obvious to a person of ordinary skill in the art at the time the invention was made to use the phenylquinoline-based compounds as set forth in claim 11 of '645 in light emitting layers, as taught by Kwong et al. (US 6,835,469 B2), because Kwong et al. (US 6,835,469 B2) recognize that iridium complexes with

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phenylquinoline ligands have improved properties (e.g. higher quantum efficiency and higher luminous efficiency) in comparison to other known devices (see column 24, lines 51-58).

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 24-26 are rejected under 35 U.S.C. 102(e) as being anticipated by Kwong et al. (US 6,835,469 B2).

Referring to Fig. 2 – compound 9, column 12, lines 40-64, and column 32, line 53 to column 33, line 25, Kwong et al. (US 6,835,469 B2) teach an iridium complex with two phenylquinoline ligands and one acetylacetonate ligand that has the same structure as the first compound listed in both claim 24 and claim 25 of the applicant's invention. Regarding claim 24, Kwong et al. (US 6,835,469 B2) teach that this iridium complex can be used in emissive layers corresponding to electronic devices. Regarding claim 25, it is reasonable to interpret that a light emitting layer is also a charge transport layer

because the charges must move through the light-emitting layer in order to recombine. Regarding claim 26, the emissive layers taught by Kwong et al. (US 6,835,469 B2) can essentially consist of the iridium compound (i.e. 100 %) or the iridium compound can be added to a host material up to an amount of about 20 weight % (see column 12, lines 40-52). Further regarding claim 26, the emissive layers taught by Kwong et al. (US 6,835,469 B2) have an electroluminescence maximum that ranges from 550 to about 700 nm (see column 12, lines 53-55).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 24-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 01/41512 A1 (Thompson et al.) in view of the article Djurovich et al. "Ir(III) cyclometalated complexes as efficient phosphorescent emitters in polymer blend organic LEDs" Polymer Preprints 41(1), 2000, pp. 770-771.

Regarding claims 24-25, Thompson et al. disclose the general formulas for electroluminescent metal complexes for use in the light-emitting layer of a light-emitting device, as $LL'L''M$ and L_2MX and L_3M , wherein M may be iridium (Ir) and each L, L', L''

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are bidentate ligands of the variety shown in Fig. 39 and called "arylquinolines," and X is a bidentate ligand such as acetylacetonate (acac; Fig. 1) or hexafluoroacetylacetonate (p. 17). (See paragraph bridging pp. 3-4 and pp. 12 and 17). As shown in Fig. 39, each ring of the arylquinoline may be substituted with R, R', and R".

Further regarding claim 25, it is reasonable to interpret that a light emitting layer is also a charge transport layer because charge carriers, in the form of electrons and/or holes, must move through the light-emitting layer in order to recombine.

Regarding claim 26, the light emitting layers emit light in the range of 570 nm to 700 nm (pp. 34 and 35). Moreover, because the compounds disclosed are the same as those claimed, the emission is inherently within the claimed range; otherwise, claim 26 would not be enabled by applicant's own admission.

However, Thompson et al. do not teach or suggest specific substituents for R, R', and R".

Djurovich et al. disclose electroluminescent iridium metal complexes having ligands that are also disclosed by Thompson et al. (Note that each of Thompson et al. and Djurovich et al. are common inventor/authors on each reference). Djurovich et al. indicate that substituting the ring of the ligands with fluorine is advantageous because it improves the solubility of the complex in the carrier matrix without much change to the emission spectrum (see paragraph bridging pp. 770-771).

It would have been obvious for one of ordinary skill in the art, at the time of the invention to use fluorine as a substituent for R, R', and R" in the arylquinoline rings of

Thompson et al., in order to improve the solubility of the compounds for subsequent manufacture of the light-emitting device, as taught by Djurovich et al.

Further regarding claim 26, Thompson et al. disclose an exemplary amount of iridium metal complex being 12% (see Thompson et al., page 30). While Thompson et al. do not teach or suggest amounts greater than 20%, this feature is *prima facie* obvious without a showing by the applicant that the claimed ranges achieve unexpected results relative to this prior art range. See *In re Woodruff*, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also *In re Huang*, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996) (claimed ranges of a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art). See also *In re Boesch*, 205 USPQ 215 (CCPA) (discovery of optimum value of result effective variable in known process is ordinarily within skill of art) and *In re Aller*, 105 USPQ 233 (CCPA 1955) (selection of optimum ranges within prior art general conditions is obvious).

It would have been obvious for one of ordinary skill in the art, at the time of the invention to use greater than 20% of the iridium metal complex in the light-emitting layer of Thompson et al. in order to increase the total amount of light which can be emitted from the device.

Response to Arguments

8. Regarding the above rejection of claims 24-26 under 35 USC 103(a), the applicant's arguments filed 29 September 2005 (see pages 14-15) have been fully considered but they are not persuasive.

Regarding the rejection of claims 24-25 as being unpatentable over the combination of Thompson et al. and Djurovich et al. (see pages 14-15 of applicant's remarks), the applicant argues that a person of ordinary skill in the art would not be motivated to use fluorine as a substituent because Djurovich et al. teach a decrease in emission efficiency. However, Djurovich et al. teach a slight decrease in emission efficiency and indicate that the increased solubility in organic solvents that results from using fluorine substituents far outweighs this decrease (see paragraph bridging pages 770 and 771). Accordingly, there would be a reasonable expectation of success when applying the use of fluorine substituents, as taught by Djurovich et al., to the arylquinoline structure of Thompson et al. Further, the applicant argues that Thompson et al. teach away from fluorine substituents because they did not specify fluorine as a substituent. However, Thompson et al. generally disclose the use of substituents and do not specify any particular substituent, which means that they are open to any specific substituent, including fluorine. Djurovich et al. is used in the combination because they specifically teach the use of fluorine as a substituent that offers the advantage of increased solubility. Also, the applicant argues that neither reference teach or suggest

trifluoromethyl substituents, but five of the compounds from the applicant's group, as claimed in claim 24 and in claim 25, use fluorine as a substituent.

Regarding the above rejection of claim 26 as being unpatentable over the combination of Thompson et al. and Djurovich et al. (see page 15 of applicant's remarks), the applicant argues that this combination lacks the limitation of an emitting layer with greater than 20 weight % iridium compound. However, as indicated above and in the prior Office action, a *prima facie* case of obviousness has been established based on optimization through routine experimentation and, per MPEP section 2144.05, the applicant needs to establish that their as claimed range is critical to their invention (e.g. by a showing of unexpected results).

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen W. Smoot whose telephone number is 571-272-1698. The examiner can normally be reached on M-F (8:00 am to 4:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr. can be reached on 571-272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SWS


STEPHEN W. SMOOT
PRIMARY EXAMINER